

FOSTERING LEARNER AUTONOMY IN ENGLISH FOR SCIENCE: A COLLABORATIVE DIGITAL VIDEO PROJECT IN A TECHNOLOGICAL LEARNING ENVIRONMENT¹

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This paper reports on the syllabus design and implementation of an English for Science and Technology (EST) course at an English-medium university in Hong Kong. The course combined elements of project-based learning and a “pedagogy for multiliteracies” (New London Group, 1996) to produce a strong learner autonomy focus. A major component of the course was a student-centered digital video project, in which students created and shared a multimodal scientific documentary. A range of new technologies and Web 2.0 platforms (including YouTube and Edublogs) were integrated into the project process in order to create a technologically rich learning environment. The design of this structured technological learning environment was informed by existing case studies of students’ autonomous language learning in unstructured online spaces. In this paper, we draw on students’ accounts (from questionnaires, focus group interviews, and Weblog comments) to evaluate the digital video project and associated technological environment. In particular, we describe the potential of the project to provide students with opportunities to exercise their capacities as autonomous learners within a structured language learning context.

Keywords: Learner Autonomy, Digital Video, Digital Storytelling, Syllabus Design, English for Science and Technology, Qualitative Research Methods

INTRODUCTION

Recent advances in Information and Communication Technologies (ICTs), including the development of various Web 2.0 platforms (O’Reilly, 2005), have contributed to the emergence of new literacy practices in online contexts. These new practices are characterized by an increased reliance on visual and hypertextual modes of representation, as well as increased possibilities for interaction and “communicational action” (Kress, 2003, p. 5). The affordances of new technologies make it possible for individuals to participate in the production and sharing of digital media and interact with a potentially global audience, in a way that is largely self-directed (Ito et al., 2008, p. 2). In addition, the new technologies offer the potential for autonomous language learning, especially in the context of “globalized online spaces” such as Flickr, YouTube, and FanFiction.net, where it is possible to share and discuss a range of digital artifacts (Benson & Chik, 2010, p. 63).

Research into these new literacy practices, conducted from the perspective of the “new literacy studies” (NLS) (Gee, 2008, p. 67), emphasises the need to develop pedagogical strategies that account for “the burgeoning variety of text forms associated with information and multimedia technologies” (New London Group, 1996, p. 60). These scholars, working primarily in first language (L1) contexts, point to what they consider to be problematic differences between traditional literacy education at school and the “everyday literacies” (Knobel, 1999) which students engage in outside the classroom. They argue that the genres and practices associated with academic literacy development should more closely parallel the multimodal literacy practices of students’ everyday lives. Of particular interest to us here is one strand of this literature, which investigates the ways in which students can make use of digital technology, especially digital images and video, in order to construct personally meaningful digital stories that reflect the kind of media which students are exposed to out of class (e.g., Vasudevan, Schultz, & Bateman, 2010). Such

research provides useful insights into issues of pedagogical design for new technologies in second language contexts.

Although most NLS research has been conducted in L1 contexts, there are a small number of case studies that focus on second language learning in new media environments (Benson & Chik, 2010; Black, 2005, 2006, 2007; Lam, 2000, 2004, 2006). These studies highlight the potential for such environments to provide opportunities for self-directed, informal language learning. In this paper, we build upon the insights of existing research in order to design a technology rich environment that draws upon emerging literacy practices in order to promote opportunities for language learning. In particular, we evaluate the potential of such a technological learning environment to foster language learner autonomy. We begin by reviewing important concepts in autonomy in language learning especially as these relate to new technologies. Then we describe the implementation of a collaborative student digital video project as part of a course in English for Science and Technology. Finally, we evaluate the ways in which the affordances of the associated technological environment allowed the students to take control of their learning.

Autonomy in Language Learning

The concepts behind learner autonomy have been promoted in the literature over the past 30 years and it is a concept which has attracted interest by language teachers as we have moved toward more communicative pedagogical approaches which encourage students to participate in their learning more fully (Miller, 2009). Learner autonomy has been defined as the ability to take control over one's learning (Holec, 1988) and is also described as a "capacity for detachment, critical reflection, decision-making, and independent action" (Little, 1991, p. 4). Learner autonomy, though, can mean different things to different people (Benson, 2001; Sinclair, 2006), and trying to identify what the *ability* or *capacity* of an autonomous learner is can cause confusion.

Learner autonomy is often mistakenly equated solely with independent out-of-class learning in which learners are in control of all aspects of their learning process. In this view, an autonomous learner is one who is intrinsically motivated and learns outside the classroom, alone, and with no need for support from the teacher. However, learner autonomy can also develop in the structured learning environment of the classroom and become part of the pedagogical objectives of a language course. When a syllabus is designed to promote learner autonomy, the focus of the syllabus is clearly on a student-centered approach (Gardner & Miller, 1999); the teacher is still very much involved in assisting learners with their learning (Schwienhorst, 2003); the development of learner autonomy can have strong collaborative elements (Little, 1995); learners can choose to be more or less independent at different points in their learning process (Dickinson, 1987); and learners can be encouraged to reflect on their learning and ways to improve it (Little, 1997).

In courses that seek to promote learner autonomy through the use of technology, it can be useful to draw upon a constructionist view of language learning. A constructionist approach can encourage students "to learn in a social context and help them to develop an ability to readily create new knowledge, solve new problems and employ creativity and critical thinking" (Sadik, 2008, p. 488). Such an approach supports the concepts promoted by collaborative epistemologies and "emphasizes the agency of the learner in the learning process" (Suthers, 2006, p. 316). *Experience* is a central notion to constructionist theory as "knowledge can and can only be generated from experience" (von Glasersfeld, 2000, p. 4). Adopting such a theoretical approach to course design, the student is viewed as an active agent who brings his or her unique learning characteristics to the social learning context. Davies and Williamson (1998, p. 10) maintain that when using a constructionist approach we shift the responsibility for learning onto learners, which helps to motivate them in their learning processes.

In a classroom-based pedagogical approach that encourages learner autonomy, the teacher creates opportunities for learners to exercise their capacity for autonomy by providing an environment in which

they can negotiate new roles as learners within the “social context” (Breen, 1986) of the classroom setting. An example of this approach is the project-based work reported on by writers such as Dam (1995), and Beckett and Slater (2005). Common threads when using project-based approaches, as reported in Dam (working with young learners) and Beckett and Slater (working with young adults), are that: the lessons are not teacher-fronted; the teacher makes use of a range of activities, including learner diaries, group work, and poster presentations; and students become sensitized to the socialization process of working collaboratively and adopt different ways of thinking about their language learning. Both Dam and Beckett and Slater report that their students invested more time and effort into their language learning and were often proud of the work they had done. By using a project-based approach, new social contexts for language learning develop in the classroom and there is a shift in roles between teacher and students. Within this social constructionist view, we align ourselves with Dam’s (1995, p. 1) definition that learner autonomy “is characterized by a readiness to take charge of one’s own learning in the service of one’s needs and purposes. This entails a capacity and willingness to act independently and in cooperation with others, as a socially responsible person.”

The development of the capacity and willingness to act independently is perceived by many as an important goal in language education. To do this, an appropriate learner-autonomy-based pedagogy, for example project-based learning, should be adopted. Schwienhorst (2007) maintains that such a learner-autonomy-based pedagogy supports reflection, interaction, experimentation, and participation of learners, and that technology can play an important role. However, different technologies have their own particular affordances and constraints, and as a result support the development of learner autonomy in different ways. It is therefore necessary to consider the potential benefits of the technological environment we ask our students to engage with and consider how effective particular technologies might be as a learning tool.

New Technologies and New Literacy Practices in Language Learning

It is often assumed that the use of technology in language teaching and learning fosters learner autonomy by providing learners with easy access to a range of resources, tools, and environments for out-of-class learning (Benson, 2001; Motteram, 1997). However, in order to develop an approach to technology capable of fostering learner autonomy we must recognize that pedagogy and technology are inter-related. It is necessary to draw on an appropriate student-centered pedagogy, as well as consider the affordances of particular technological tools for autonomous language learning and how students will utilize these affordances (Hafner & Candlin, 2007; Schwienhorst, 2007). Case studies into language learners’ informal out-of-class learning in emerging communicative contexts provide a useful starting point in understanding these affordances.

Benson and Chik (2010) point out that emerging globalized online spaces provide new opportunities for language learning to occur autonomously as part of learners’ everyday literacy practices. An early case study of this kind of autonomous learning is provided by Lam (2000) who describes the way in which a US-based Hong Kong Chinese teenager (Almon) established a J-pop Web site and made use of a range of ICTs to interact with online chat mates from all over the world. This self-directed, out-of-class learning had a significant impact on Almon’s development of English. Lam (p. 476) comments that “whereas classroom English appeared to contribute to Almon’s sense of exclusion or marginalization (his inability to speak like a native), which paradoxically contradicts the school’s mandate to prepare students for the workplace and civic involvement, the English he controlled on the Internet enabled him to develop a sense of belonging and connectedness to a global English-speaking community.” This and similar case studies (Black, 2005, 2006, 2007; Lam, 2004, 2006) provide useful insights into the potential for technology rich environments to provide opportunities for informal, autonomous language learning. In designing technological learning environments in formal language learning settings, there is much to be gained by emulating the design of globalized online spaces.

One possible pedagogical strategy is to adopt a student-centered project-based learning approach (Warschauer, Schetzer, & Meloni, 2000), utilizing the same kind of media and technological environments that learners are engaged with outside of class. In the context of L1 literacy instruction, researchers and practitioners have been particularly interested in students' creation and sharing of multimodal texts using digital images and digital video (see, e.g., Bull & Bell, 2010; Bull et al., 2008). It is thought that such multimodal digital compositions have the potential to bridge the gap between in-class and out-of-class literacy practices. As a result some educators have begun to explore the potential of digital storytelling projects, as a pedagogical tool to engage learners. In such projects students work either individually or in groups to design and construct a short, movie-like digital production, known as a digital story.

Digital stories combine traditional storytelling and narration with images, video, and audio (e.g., a soundtrack or other sound effects). The main features of a digital story, as described by Lambert (cited in Robin, 2006) are: a point of view, a dramatic question, emotional content, economy, pacing, the gift of your voice, and an accompanying soundtrack. Frequently digital stories focus on the telling of a personal narrative, which the storyteller is genuinely invested in because of its personal significance (Kajder & Swenson, 2004, pp. 19-20). In any case, regardless of their exact form, digital stories have a strong personal dimension and should "reflect, in one way or another, the student's way of perceiving, interpreting and transmitting the knowledge s/he has acquired or is still acquiring" (Gregori Signes, 2008, p. 45). In spite of this strong personal dimension, digital stories are not limited to the personal narrative genre and may be designed to tie in to students' academic skills, fostering the development of critical thinking and media literacy (Ohler, 2006). Thus, Robin (2008, pp. 224-225) reviews a range of different types of digital stories, including personal narratives, stories that inform or instruct, and stories that examine historical events.

Students constructing digital stories must combine a variety of traditional and new literacies to create their multimodal product. In addition, the construction of a digital story is an integrated task, which combines a wide range of roles (e.g., script writer, director, editor) and skill development opportunities. These include: research skills (e.g., finding and analyzing information), writing skills (e.g., preparing a script), organizational skills (e.g., managing the project), technology skills (e.g., learning new multimedia skills), presentation skills (e.g., deciding how best to present information to an audience), interpersonal skills (e.g., working with team-mates), problem solving skills (e.g., making decisions about the project), and evaluation skills (e.g., critiquing own and others' work) (Robin, 2006, p. 5). In the context of language education, Rance-Roney (2008, p. 29) points out that "deep language acquisition and meaningful practice" is embedded in the digital storytelling process.

The construction of a digital story is considered motivating and empowering for learners. Bull and Kajder (2004, p. 49) note that:

[Digital storytelling] can provide a voice to struggling readers and writers who might not otherwise find an authentic means of expression. It places the technology in the hands of the learner, allowing him or her to control its use within objectives that are carefully constructed by the teacher.

In digital storytelling projects, the use of multimedia technology allows learners to create a multimodal artifact which, unlike many academic writing tasks, strongly resembles texts that students encounter through the media as part of their everyday lives. However, some caveats are in order. Language teachers planning a digital story project must encourage students to focus on the story, not the technology (Kajder & Swenson, 2004; Ohler, 2006) and focus on issues of language use (Gregori Signes, 2008).

This brief review suggests that digital storytelling projects have a number of features that lend themselves to the promotion of language learner autonomy. Such projects would provide a social context or learning environment within which learners are able to interact with one another as well as experiment with a range of digital video technology in order to create personally meaningful multimodal artifacts. Furthermore, learners' ability to use such digital video technology to capture and play back their own performances as well as the performances of others would facilitate reflection on their language learning. However, there is as yet little empirical second language education research examining the affordances of digital storytelling projects to motivate second language learners and foster autonomy in the language learning classroom. In this paper, we describe and evaluate the implementation of one such digital video project, focusing on the ways in which the technological learning environment supported autonomy in language learning. Our investigation is guided by the following research questions: Does the technological learning environment promote autonomous language learning? If so, how?

CONTEXT, METHODS, AND DATA SOURCES

The study reported on here took place at an English-medium university in Hong Kong. The university has a high-technology environment with computers and audio-visual facilities provided in each classroom, and a well-established learning management system used by students and staff. In addition, most students own laptop computers and can bring them to tutorial classes in order to work on the kind of project reported on in this paper. The EST course offered to the students was a required course, with one 3-hour class per week, over a period of 13 weeks. Students taking the course were between 18-23 years of age, with a roughly equal mix of males and females, and were studying Applied Biology, Applied Chemistry, Environmental Science and Management, or Mathematics. Most students took the course in their first year of study, but there were also second and third year students in the class. It was assumed that the students entering the EST course already had an upper-intermediate standard of English proficiency and that they would be able to deal with complex content in their disciplines.

Implementation of the Digital Video Project

The course was primarily organized around a student English for Science project.² The students were provided with a project prompt, similar to the prompts for practical lab or project work in their own disciplines, which detailed the procedure of a simple experiment. In order to complete the project students worked in groups of three to: (a) do background research and develop a hypothesis for the experiment; (b) carry out the experiment, documenting the procedure and results; (c) present findings to classmates in the form of a multimodal scientific documentary (group work due in week 7 of the course) and a written scientific report (individual work due in week 14). The multimodal scientific documentaries created were in many respects similar to digital stories (as described above), but instead of telling a personal story, students drew upon established scientific conventions in order to document their experiences with the experiment. The documentaries constructed thus blend rhetorical and linguistic features characteristic of highly authoritative scientific genres such as the research article or dissertation (Swales, 1990), with those more typical of popularizations of science (Hyland, 2010). These student products provide interesting insights into the language learning gains made by students. However, our primary focus in this article is on the language learning process and the extent to which that process fostered learner autonomy.

A number of measures were taken to facilitate collaborative learning on the digital video project. In order to assist students in forming their project teams we asked them to reflect on the roles that they would need to perform in completing the project: researcher, field-worker, script-writer, director, actor, camera-operator, and editor. Students were advised to identify team-mates with complementary interests and skills. In order to assist students with time management, we provided clear targets for different stages of the project and reviewed progress with students in class. For example, students were expected to have completed their data collection by week 4 of the course and have developed their script by week 5. Finally, in order to assist students in monitoring the group dynamics in their team, we asked them to

evaluate the effectiveness of their team functioning, by completing a short questionnaire on possible problems (following the procedure suggested by Oakley, Felder, Brent, & Elhadj, 2004). The main purpose of this last strategy was to raise students' awareness of potential problems and provide a platform for discussion of such problems if the need should arise.

Design of the Technological Learning Environment

For the purposes of this paper, we use the term *technological learning environment* in a broad sense to include the full range of technological tools and resources used to support the learning process. The technological learning environment was primarily designed to support students in their project work, especially the planning, construction, and sharing of the scientific documentaries. The design followed a modular system, incorporating a range of technological tools, which include: (a) learning management system for course administration, (b) course Weblog for weekly reflective discussions on coursework, (c) DV cameras and editing software for video production, (d) resources Web site for support with video editing software (in the form of screencasts), (e) YouTube channel for sharing the videos created. The architecture of the technological learning environment can be conceptualized in terms of the stages of the English for Science project, as illustrated in Figure 1.

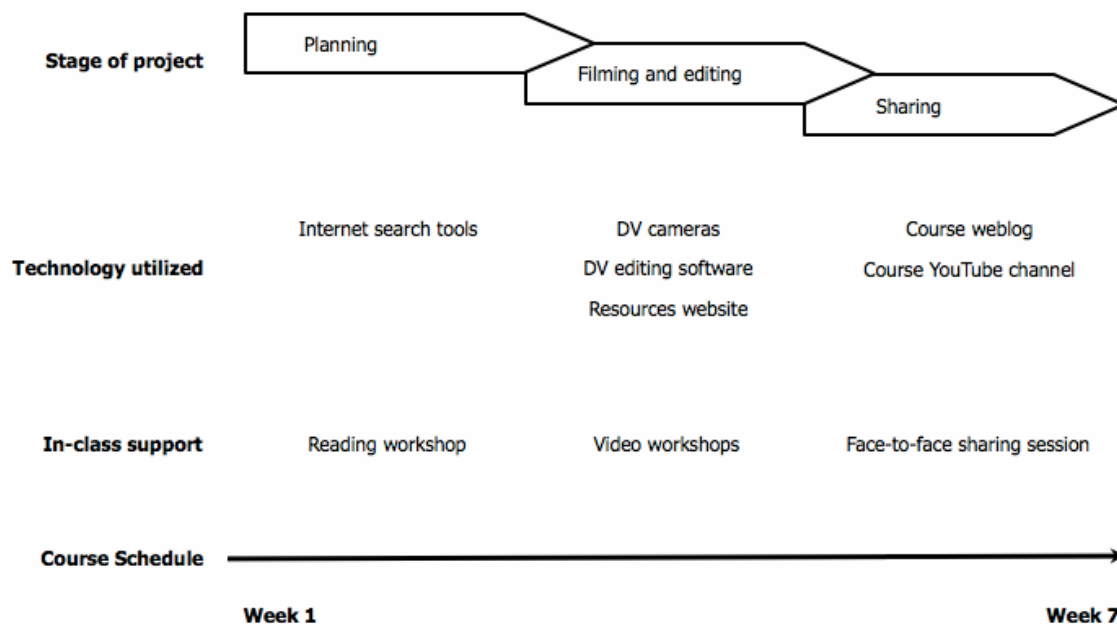


Figure 1. Architecture of the technological learning environment.

In the planning stage, students learned to use a variety of Internet search engines and online databases in order to locate and evaluate information relevant to their experiment. This process was supported by an in-class reading workshop, which took the form of a Webquest (Dodge, 1995) and aimed to develop critical literacy skills. In the filming and editing stage, students learned to use DV cameras to capture images and movies, and editing software to add narration, music, text, and simple effects such as transitions. This process was supported by two in-class video workshops: The first workshop, in week 3, focused on creating a digital story using Photostory 3 for Windows; the second, in week 6, was a troubleshooting session. In addition to the technological tools introduced in class, technical support for a range of other tools (e.g., Windows MovieMaker, iMovie) was provided through online guides and screencasts on a course Web site, and students were encouraged to explore and utilize these other tools. Finally, in the sharing stage, students uploaded their videos to the course YouTube channel. These were then embedded

in the course Weblog, allowing students to post comments and feedback about the final products. This online sharing was supplemented by a face-to-face sharing session in class, in which students viewed each others' documentaries and provided feedback. The aim of this session was to allow students the opportunity to showcase their work and celebrate the creation of the documentaries.

The use of technology in the English for Science project was always matched by face-to-face sessions, designed to provide students with the necessary support and scaffolding. In this sense, the technology was seamlessly integrated into course procedures and served to extend the learning environment in two important ways. Firstly, by using digital video, students were able to create a multimodal artifact, drawing on new (as well as traditional) literacies to incorporate images, movies, music, and audio narration into their documentaries. Secondly, in using the Internet to research and share their projects, students went beyond the traditional four walls of the classroom, drawing on authentic online sources to inform their projects and targeting an authentic, potentially global audience with their scientific documentaries.

Data Sources and Analytical Methods

In order to evaluate the video project innovation, we adopted a qualitative interpretive approach (Davis, 1995; Richards, 2003), aiming to provide a contextually rich account of the learning environment under investigation. Such an approach is particularly appropriate, we argue, for the evaluation of complex technological learning environments where numerous factors meet and interact as part of a dynamic learning ecology (van Lier, 1998): technology, people, processes, social and institutional constraints. With so many competing factors it is sometimes difficult to isolate contextual variables and establish clear relationships of cause and effect. A qualitative interpretive approach to evaluation assumes that the in-depth, "thick" description (Geertz, 1973) of a particular technological learning environment, based on a variety of data sources, can account for the range of contextual factors and yield insights into the social behaviour of actors in that environment.

As noted earlier, the participants in this study were drawn from a cohort of 67 university science students participating in a course in EST. The students were first surveyed through an anonymous questionnaire (59 responses), with both open and closed items (see Appendix A). This questionnaire was followed up by semi-structured focus-group interviews (see Appendix B) with approximately one third (21) of the students. In addition, the majority of students (62) reflected on their language learning in their weekly comments to the course Weblog.³ As course designers and teachers of the EST course in focus, our analysis of these primary data sources was also informed by our continuous involvement (over a period of more than two years) in the research site: weekly lessons with students, ongoing conversations as well as a formal focus group interview with the program leaders from students' major subjects (i.e., Applied Biology, Applied Chemistry, Environmental Science and Management, Mathematics). Such intense and prolonged engagement is characteristic of a rigorous design in qualitative interpretive research (Miles & Huberman, 1994, p. 6). Finally, as teachers of this EST course, it is worth noting that standard procedures of ethical research were followed, with students participating in the evaluation providing informed consent for the collection of data. The primary data sources are summarized in Table 1.

Table 1. *Primary Data Sources and Analysis*

Research instrument	Participants	Analysis summary
Anonymous questionnaire	59 students	409 coded segments
Student focus groups	21 students in 12 focus groups (2-5 per group)	612 coded segments
Student Weblog comments	62 students, 378 comments	60 coded segments

The analysis of qualitative data collected (i.e., open questionnaire responses, interview transcripts, and

Weblog comments) was carried out by a small team of researchers, all teachers on the EST course. The data analysis was facilitated by the use of qualitative data analysis software, MaxQDA (Belous, 2010), allowing for the easy coding, annotation, and retrieval of data (see Weitzman, 2003 for a review of such software). This software allows researchers to discover patterns in a bottom-up way, by coding important extracts, or segments, of the data. As the analysis proceeds, researchers can group similar codes in a tree-like code system in order to establish key emerging themes and relationships among them.

In the present study, the research team met and worked together to code a portion of the data, discussing the rationale for identifying particular emerging themes and categories. Next, the remaining data were coded by individuals according to the agreed categories. Finally, the research team met again in order to review the analysis and suggest refinements to the categories adopted. This process of constant comparison of codings, categories, and relationships in the data is important to ensure trustworthiness in qualitative data analysis (see Richards, 2003). Figure 2 shows the complete code system which emerged from the analysis (due to the volume of data only some of the sub-codes are displayed). After analysis, there were a total of 1,169 coded segments grouped into 10 primary categories and 52 subcategories.

FINDINGS

In this section we consider how the digital video project and associated technological learning environment appear to have promoted some form of learner autonomy, that is encouraged students to take responsibility for, monitor, and reflect on their learning. The main themes emerging from the data are: motivation, authenticity, independent learning, teamwork, peer-teaching, and reflection on learning. For each theme we describe students' perceptions of the reported behaviour, as evidenced by extracts from the questionnaire, focus-group interviews, and Weblog comments. In order to protect the identity of student participants, students' names are replaced with pseudonyms, following standard reporting practice in qualitative inquiry.

Motivation

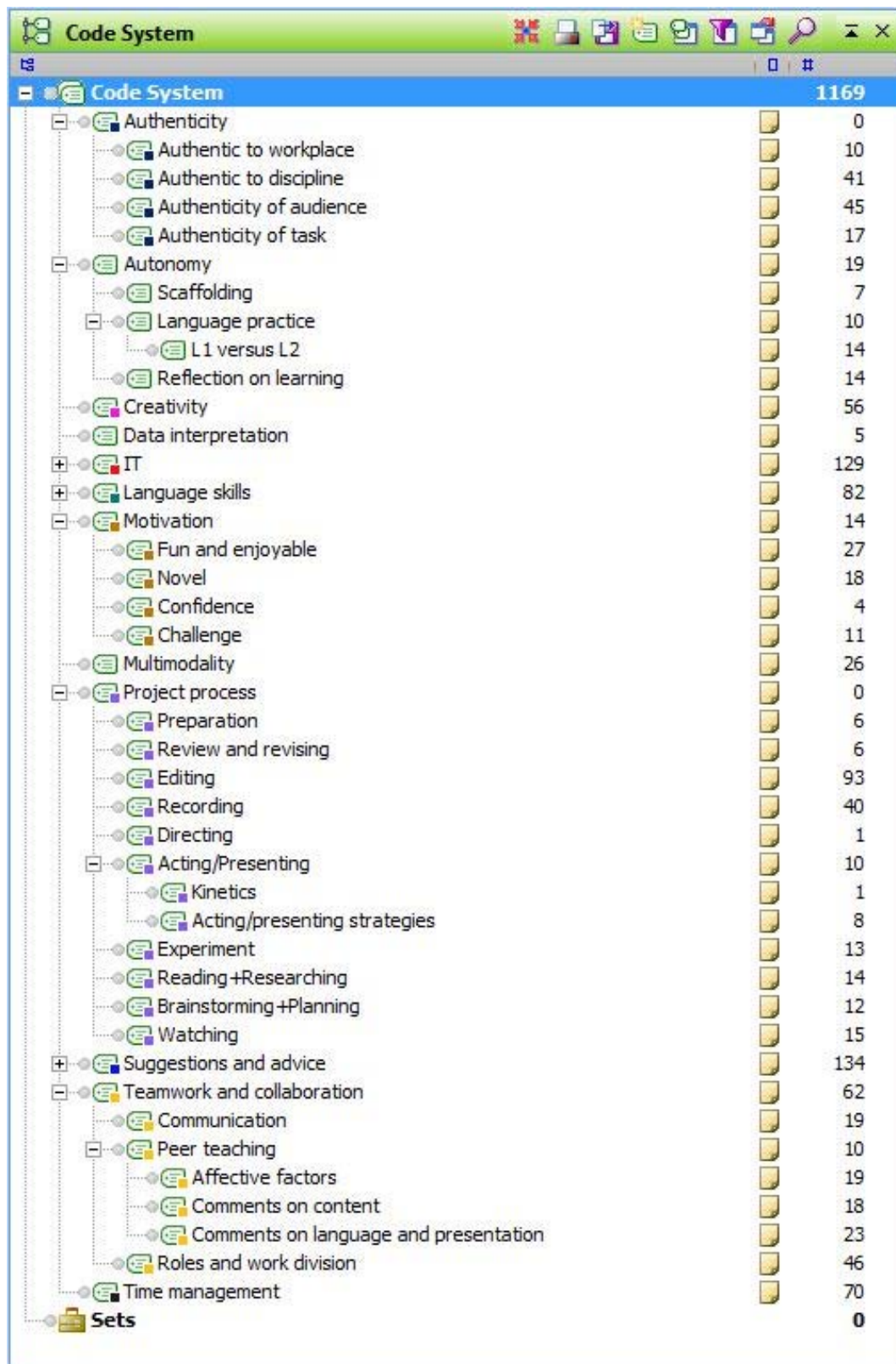
The digital video project task appears to have been highly motivational for students. Their comments show that they found the project to be novel, fun, and challenging. Many of the students commented that the process of making a video was new to them, and some also observed that it was different to the kind of traditional academic reading and writing that they were used to:

[The most enjoyable thing about the video project is] to learn to make a video, because such work is new to me and I find it interesting to learn it. [Questionnaire ID54]

It's very different than what we've done in the past year. We only did presentations and probably like lab projects. This is very different to us. So, it is challenging but I think it's at the same time makes you to be more creative. You can be like add your own creativity into it instead of just reading and writing. [Focus group, Jane]

Thus, the novelty of the project appears to have caught the imagination of the students. When asked what they enjoyed about the video project, students commented especially on conducting their experiment, the video recording process, and sharing their projects, all of which they characterized as a fun process. It made them laugh and gave them a sense of satisfaction:

[The most enjoyable thing about the video project is] to shoot the video together and share our video. The process is funny, and we can make friends with many people. When sharing our video, I do feel that our efforts are worthy. [Questionnaire ID10]



The screenshot shows the 'Code System' window in MaxQDA. It displays a hierarchical tree of codes on the left and a corresponding frequency table on the right. The total number of codes is 1169. The codes are organized into several main categories, some of which are expanded to show sub-categories.

Code	Frequency
Code System	1169
Authenticity	0
Authentic to workplace	10
Authentic to discipline	41
Authenticity of audience	45
Authenticity of task	17
Autonomy	19
Scaffolding	7
Language practice	10
L1 versus L2	14
Reflection on learning	14
Creativity	56
Data interpretation	5
IT	129
Language skills	82
Motivation	14
Fun and enjoyable	27
Novel	18
Confidence	4
Challenge	11
Multimodality	26
Project process	0
Preparation	6
Review and revising	6
Editing	93
Recording	40
Directing	1
Acting/Presenting	10
Kinetics	1
Acting/presenting strategies	8
Experiment	13
Reading+Researching	14
Brainstorming+Planning	12
Watching	15
Suggestions and advice	134
Teamwork and collaboration	62
Communication	19
Peer teaching	10
Affective factors	19
Comments on content	18
Comments on language and presentation	23
Roles and work division	46
Time management	70
Sets	0

Figure 2. MaxQDA code system.

[The most enjoyable thing about the video project is] shooting, we got some funny shots while taking [video]. It made us laugh. [Questionnaire ID27]

Finally, some students commented that the project presented a special challenge, which they appeared to respond to in a positive way:

Yeah, I also enjoyed because this is a new kind of learning. So we never met such challenging in high school, so maybe it was a new approach for us to learn how to apply our knowledge in this - making a video in this aspect was very special and this is a new challenge and I think it's interesting, yeah. [Focus group, Dan]

This last comment must be balanced against the perceptions of some students, that they had encountered problems using the technology. In some cases it seems that they were rather ambitious and so became frustrated that their technical abilities limited the quality of their final product, though it should be noted that all did in fact succeed in producing interesting videos:

I think, uh, we learned how to use the editing software, but I think it is really difficult to use this software because we haven't used that software before and so we edited the movie and we face many technical problems. [Focus group, Mark]

It [the challenging thing] must be making the animation because we don't want to simply catch the animation from the video that we can find in YouTube. We just want to create by ourselves but our technique is really low... And sometimes we cannot transfer what we think into the video to present to the others... [Focus group, Nancy]

On the whole, students met the challenge of learning new IT skills head on and in most cases reported that they enjoyed being given the opportunity to develop such skills.

Authenticity

Linked to the above comments on motivation is students' perception of the digital video project as a meaningful and authentic task. Several students commented that this kind of task was suitable for "21st century" students and that the ability to create multimedia presentations could be useful for other courses and when they entered the job market:

Actually, in this project, I learned many skills besides case studies or content: the technique of making a video, also as we said before the presentation skills. It also let us become more creative and I have many other subjects require us to present in the class. And I would like to use more multimedia in my presentation later on and I think it would be attract my audience. [Focus group, Nancy]

[The most useful things learned were] the procedures and element to make a documentary. I think as a 21st university graduates, it's better if we have some knowledge of multimedia production. [Questionnaire ID33]

In addition, many (though not all) students envisaged that their work would be viewed by a wide Internet audience, not only their class teacher. As a result of this perception, students put more effort into the final version of the video. The students understood that the teacher would assess their work, but it seemed equally important to showcase their best work to a larger audience of their classmates, friends via social networks, and the general public who might view their YouTube videos:

Uh, I will consider the teacher will be the first audience because, uh, his documentary is a homework for me. [Focus group, Colin]

Because, um, a lot of people may [view] it not just our class, classmates, so I would do it, I will pay more effort to do it and I also will treat the documentary as a real documentary because it's just like the documentary done by BBC or some others, although the topic is quite simple or quite basic... [Focus group, Joyce]

Independent Learning

In constructing their digital videos, students reported two kinds of independent learning: independently practising and using English, and independently searching for information related to the content of the video or the use of technological tools. Students commented that the video project “forced” them into practising their English. For instance, they were engaged in writing a script for the video, and then while filming, students mentioned that they had to re-take shots many times, thereby practising their oral English more. Some students described how the requirement to identify volunteers for their experiment brought them into contact with exchange students, whom they talked to in English. And of course, the students used English when presenting their ideas on the video:

Taking videos was the most enjoyable aspect because I can work with different people, volunteers and communicate with them. This action forces me to use English to communicate and it's sometimes quite interesting. [Questionnaire ID57]

I also have record many times as I was responsible for the discussion part and [pause] and every time I record and then I listen to my voice, I just think that my pronunciation, my intonation is not good enough and I try to record it again and again. [Focus group, Cath]

As well as language practice, students reported being engaged in independent exploration of Internet resources when doing background research for the scientific documentary. In addition, they also reported using Internet resources in order to learn how to use the technology needed to construct the digital video. Although support for the relevant tools was provided through screencasts on a dedicated resources Web site, students preferred to do their own independent exploration:

That's [the resource Web site is] one thing, but most of the time we Google it. [Focus group, Terry]

I would download some software from the Internet and just read the instruction, how to use it and try, and trial and error. So this is my way to overcome the technical problem. [Focus group, Dan]

Thus, students intuitively made use of the Internet as a tool for exploratory, just-in-time learning.

Teamwork and Managing the Learning Process

As noted earlier, an important feature of project-based learning is the opportunities it presents for collaborative learning as part of a team. There were many comments from students relating to this teamwork aspect of the project, with students describing how they learned to monitor not only their own learning process, but that of the whole group. Most students felt that it was necessary for one member of the group to take a leadership role, in order to facilitate time management and to co-ordinate the efforts of the whole team. In this respect, students emphasized the importance of good communication between team-mates for effective team functioning:

[As team leader] I have to set up the schedule, the planning and talk to my group mates about the

time we are going to do and before what day we have to finish this task and I have to distribute the work to them. [Focus group, Dan]

I think, um, the [pause] the regular meeting is very important... and also communication because if you have any problem and you don't tell others, so no one can help you to solve it. [Focus group, Yong]

I can learn how to arrange everything in a limited time and get the work done. It is essential to have a planning before work so that in case a problem occurs there is still a room and time for correction and improvement. [Questionnaire ID20]

Students also described how they managed their own and team-mates' roles on the project. They realized that the project was too involved and complex for them to do on their own, and as a result most groups negotiated specialist roles for individuals with particular skills or interests:

From this project, I learned how to know our own strength and weaknesses so that to divide the job or divide different people into doing different kinds of the assignments... So, um, also, I think my group have very good teamwork because, uh, for me, I'm working as for editing and Paul, uh, working as actor and Ralph for researching some information and writing the scripts. So I think it's very effective. [Focus group, Vee]

This kind of specialization was restricted to a degree by a course requirement that every member of the team must present a (roughly equal) portion of the documentary. This requirement was adopted in order to ensure that all members of the team would practice English presentation skills as part of the project.

Peer Teaching

The collaborative group work project created a social context for learning which provided ample opportunities for peer teaching, either peer teaching of English or peer teaching of technology skills. Many of the students said that they turned to their team-mates for help in correcting their English while preparing the video:

I learned so much from my group mates because for me, my English is not good. But for my group mate, they have a good, good language, yes, so they help me for, uh, editing this video very much. [Focus group, Colin]

Furthermore, as students had adopted specialist roles to facilitate the team-work, they sometimes had to pass on their specialist knowledge, for instance of the English technical terms used in the script, to other team members responsible for editing the video:

For example, actually the script of the theory part is written by Janet and I'm going to edit it. And if she don't explain the words to me, what is the theory about, [then] I must consume so much time on understanding the script... And so, she helped me out. [Focus group, Nancy]

Peer teaching was also a focus of discussion and feedback when learning to use the technology or finding suitable content for the video. In several cases students immediately identified someone in their group who was techno-savvy and who they could rely on to take care of the technical side of the project, or who could teach them how to do it:

For the technical challenges, I think I'm very lucky because I have Chris to help to us solve all the problem. [Focus group, Yong]

The problem is that I haven't made a video before. I have just learn some from my groupmates.
[Questionnaire ID04]

Significantly, peer teaching was not limited to peers in the same group or even peers in the same class. Some students described how they shared their YouTube videos with friends and how the feedback that their friends provided in response enabled them to notice problems in their own performances:

The students from the unit course and my friends are also my target audience because the students will give some comments on the video and my friends can also comment on the video before the deadline of my assignment so I can correct some mistake. [Focus group, Ian]

Later we also watch the final products many times I think and showed it to my friends. [Laughing]...and they also pointed out something that I should improve later... like you don't need to nod my head all the times. [Focus group, Terry]

Such peer feedback would not have been possible if it were not for the technological affordances of the digital video, to create a permanent record of the performance capable of being shared through the Internet.

Reflection on Learning

Related to the notion of peer feedback are the weekly interactions in the course Weblog, similar to interactions in an online discussion forum, which provided students with an opportunity to reflect on their learning. Of particular interest here are students' responses to the week seven post, where students' YouTube videos were embedded and shared. The post invited students to comment on each others' performances. An analysis of student comments shows that they were oriented towards issues of: language proficiency and presentation, content, and affect (e.g., showing support).

Throughout this video, there isn't any subtitle. But I think since the pronunciations of narrators are good most of the time, it doesn't affect the concept-understanding of the viewers. The language control is perfect; good English and good usage of certain words and sentences.
[Weblog post, Sai Hee, October 22nd, 2009 at 8:56 pm]

Finally we have finished our filming! I think we all have done well in this project as most of us have never done this before! Watching the documentaries of other team we can know more about the inadequacy in our video. For example, Bill's group does impress me the most! The filming technique is perfect and the video shows well balanced in both entertainment and academic aspect. We watch their video with our full attention, just like watching a real TV show! It is a very amazing and professional documentary! [Weblog post, Mark, October 19th, 2009 at 7:57 pm]

Thus, commenting on the digital videos in the course Weblog allowed students to celebrate their achievements and reflect, albeit in general terms, on content and use of English in the videos. It is possible that this evaluation of peers' digital video projects, mediated as it is by online writing, helps students to achieve a degree of reflective detachment which would otherwise not be possible (e.g., in the context of the in-class sharing session).

DISCUSSION

We were guided in examining the data gathered from the study by the following research questions: Did the technological learning environment promote autonomous language learning? If so, how?

The students' reported practices and perceptions illustrate the way in which the technological learning

environment afforded opportunities for autonomous language learning. Students' comments suggest that they found the digital video project to be novel, fun, challenging, and meaningful. Their comments also indicate that they invested heavily in the digital video project and were motivated to take control over many aspects of their learning: independently practising and using English in the preparation of their videos, independently exploring the Internet when searching for information, working as a team to monitor each other's learning, eliciting and providing peer support for issues of language and content, utilizing the course Weblog as an online space for reflection on learning. These reports show that the digital video project and associated technological learning environment provided students with opportunities to take control of their learning and that students took advantage of these to exercise their capacities as autonomous learners.

In the context of this digital video project, the exercise of learner autonomy observed can be attributed both to the pedagogy adopted, and the particular affordances of the technology used. First, the complexity of the digital video project, as well as the careful way in which it was scaffolded, encouraged students to cooperate in ways that fostered peer teaching and raised awareness of important aspects of the learning process, such as time management. The project-based learning methodology allowed us to create a realistic social context, within which learner autonomy could develop. Second, the use of digital video provided students with a record of their own spoken performances, which they were able to view and evaluate immediately. This frequently led students to notice their own weaknesses, motivating them to practice and improve. By viewing their video, students were able to develop the necessary critical detachment to reflect effectively on their language learning. In addition, the potential to share the videos through the Internet both motivated students, and provided them with further opportunities for peer feedback and support.

In their comments, students emphasized that the technological learning environment afforded the possibility to write for a real audience, and that this motivated them to put more effort into the construction of the documentary. Other studies into the use of digital video highlight the importance of providing learners with the opportunity to select personally meaningful content (e.g., Vasudevan, et al., 2010). In this study, students were provided with a topic that was intended to reflect the kind of academic work that they were doing for their major subject, following principles of course design in English for Specific Purposes. Here, it appears that students perceived meaning in the task because they felt that they were writing for a real audience in an online space that they were familiar with (i.e., YouTube and the course Weblog). Indeed, a number of existing studies highlight the motivating potential of writing for an authentic audience in such spaces (Black, 2005, 2006, 2007; Lam, 2000, 2004, 2006). In spite of this potential, it is not uncommon in educational settings for teachers to hide students' work behind a protective firewall within an institutional intranet or learning management system. Such practices, understandable as they are, make it impossible for students to interact with a wider audience, and may therefore bring the meaningfulness of the coursework into question.

In the present study, students were using tools and media which they were familiar with from their own lives and which, as 21st century digital citizens, they regarded to be important to master. It seems likely that students perceived the digital video task as useful because they are themselves very aware of the ways in which communication practices are evolving in the digital age to rely more on multimodal content. We argue that in light of these developing communication practices, there is a need to rethink the scope of the language curriculum in order to include the construction of multimodal texts, in the same way as literacy instructors in L1 contexts (Bull & Kajder, 2004; Kajder & Swenson, 2004; Marquez-Zenkov & Harmon, 2007). Refocusing the curriculum in this way would help to re-establish its relevance to students' literacy practices in informal, out-of-class contexts. The language classroom would become a place where students learn how to combine digital image and digital video with other semiotic resources such as written text, in order to effectively convey meaning, on their own terms and through a medium that makes sense to them.

This study suggests an approach to the design of language courses which aim to foster the development of language learner autonomy. Our experience shows that a structured learning environment can be designed to emulate the kind of informal learning opportunities found in learners' unstructured learning environments (see Gardner & Miller, 1999, p. 57). The technological learning environment described in the present study is designed to draw upon the media and tools which students utilize in their unstructured, out-of-class learning. In the design, we have been assisted by new literacy studies that describe the affordances of new technologies and globalized online spaces to create out-of-class learning opportunities. These same studies also point to problematic differences in school literacy practices compared to students' everyday literacy practices (e.g., Knobel, 1999). Indeed, the kind of autonomous language learning that we have described in this paper is only possible if it has the full support of the institution and its language teachers. First, it requires unfettered access to the Internet, which cannot necessarily be taken for granted in all educational settings. Second, language teachers must be willing to adopt a more facilitative role, moving from "sage on the stage" to "guide on the side". In this, they need to be supported by the institution, which must redefine language teaching and learning to include the kind of complex, high-level project-based learning that we have illustrated here.

CONCLUSION

In this paper, we have described the implementation of a digital video project for language learning, as used with undergraduate university science students. We have evaluated the digital video project in order to show the potential of the technological learning environment to provide opportunities for autonomous language learning. As a case study of one course in one tertiary institution, the study is necessarily an exploratory one. We do not intend to suggest that the practices reported here are uniform and indeed there is likely to be some variation in the way that different students approached the digital video project. Rather, our intention is to highlight the potential of the technological learning environment designed here, in order to make suggestions for best practice.

The findings of the study show how it is possible to draw upon students' literacy practices in unstructured, informal learning contexts in order to design a technological learning environment capable of fostering learner autonomy in a structured setting. As we have seen, the students in this study took advantage of the affordances of the technological learning environment in order to exercise high degrees of autonomy. We argue that students invested in this digital video project because: (a) students were engaged in a 21st century task utilizing multimodal texts, media, and online environments that were meaningful to them; and (b) students were able to share their videos through the Internet, engaging an authentic audience including not only their peers but also their other social networks and the wider public. Thus, student learning in this project was not confined to the classroom in the traditional way. Rather, as students shared their videos, the traditional boundaries of the classroom broke down and learning extended into virtual spaces that were under the control of the learners, not the teachers. We have now entered a digital age which is characterized by widespread participation in globalized, online spaces which offer rich opportunities for informal, self-directed learning. The findings of this study suggest that language educators may draw upon the architecture of such spaces in order to design opportunities for autonomous learning in formal contexts.

APPENDIX A. Open items from questionnaire

- What was the most enjoyable aspect of the video project? Why?
- What was the most useful thing that you learned by doing the video project? Why?
- What problems did you encounter when doing the video project? Please explain.

- What would you like to change about the video project? Why?

APPENDIX B. Focus group topics

- General perceptions of the digital video project
 - Authenticity and effectiveness
 - Audience and purpose/creativity
 - Multiliteracies and technology
 - Collaboration and task management
 - Medium of instruction/learning
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NOTES

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2. Examples of supporting teaching material for the English for Science project and examples of the digital video created by students is documented in greater detail at <http://www1.english.cityu.edu.hk/acadlit>.

3. Examples of students' Weblog comments can be viewed at <http://en2251.edublogs.org>.

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